Cover Page

HYDROLOGY REPORT
For TPM 20850RPL-1, S04-066
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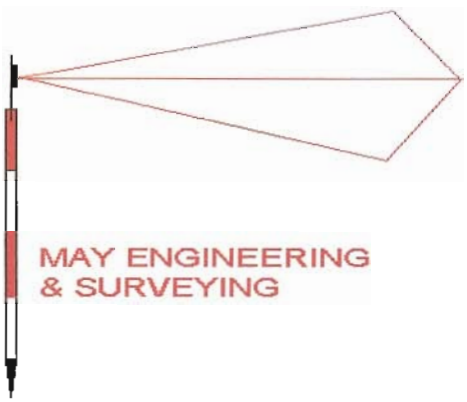

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WO 6344

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Project Discussion

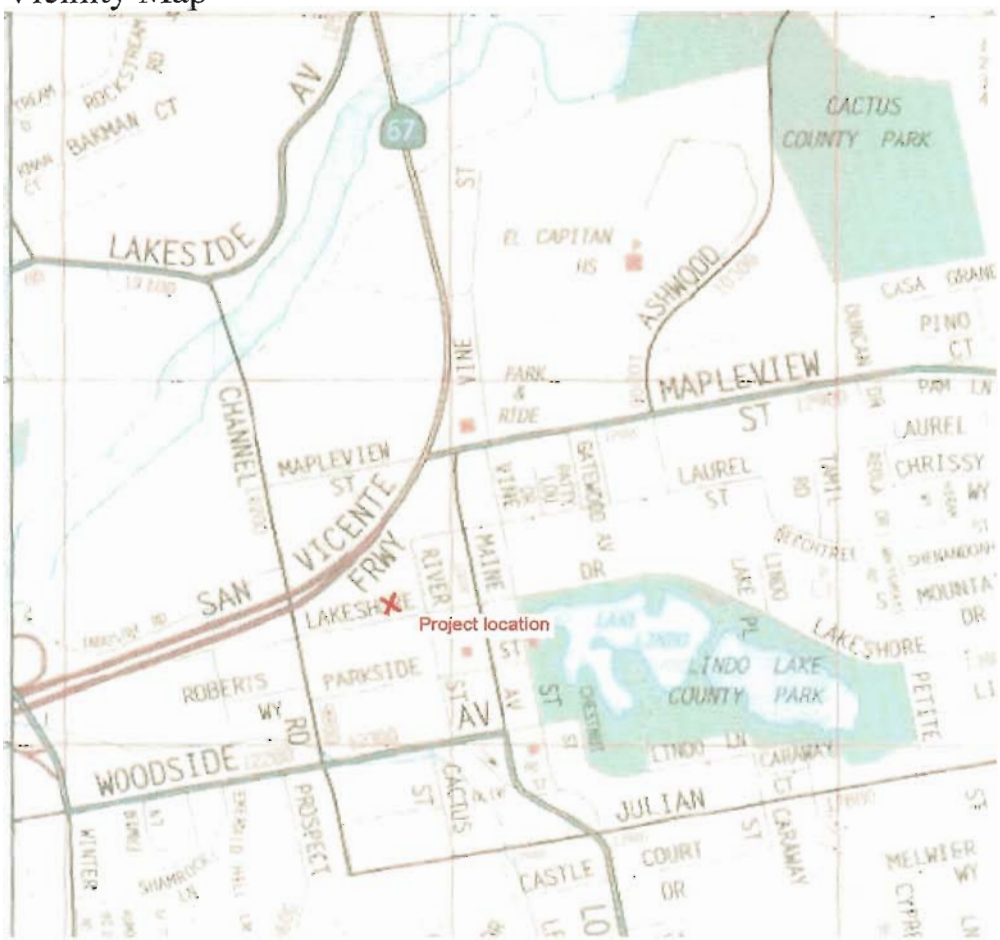
Project Purpose

The project proposes the construction of a four-plex on an existing 7,500 square feet (0.17 acre) residential lot within the downtown area of Lakeside. The project is located in the Lakeside Community Plan area.

The proposed project would add a four-plex to the existing vacant property. The subject property is zoned RU-29 permits a maximum density of 29 dwelling unit for each acre of lot area. The actual density proposed is approximately 24 dwelling unit per acre.

The project is located on Lakeshore Drive between Channel Road and River Street. See the following vicinity map.

Vicinity Map



Aerial Photograph of Project Area

Description of Watershed

The general watershed area is extremely small and is confined to the site. None of the watershed is off-site and no flows enter the project property. The project property is generally flat and drains to Lakeshore Drive on the south side of the property. The immediate adjacent area is mostly developed lots with homes and apartments (see aerial photo previous page). There is a private storage yard to the north of the property The elevations on the project site range from approximately 97 feet above sea level along the northern property line to approximately 96 feet above sea level at the southeastern boundary of the property where it empties onto Lakeshore Drive.

The drainage flows originate on the project with no flows entering from properties immediately adjacent to the project. The drainage generally originates from the northwest and flows across the site towards the southeast side of the property. The drainage from the project empties on-site onto Lakeshore Drive, a publicly maintained street running east and west along the project. This results in relatively small drainage areas with very small flows.

Methodology

The hydrology analysis for this project was conducted in accordance with the San Diego County Hydrology Manual dated June 2003. Because of the size of the drainage basins involved, the Rational Method was used as specified on page 3-1 of the Manual. There are no junctions of independent basins as described in Section 3.4 of the Hydrology Manual. Therefore, it was not necessary to use the Modified Rational Method to combine flows.

All hydraulic analysis was conducted in accordance with standard engineering practice. The references used for these analyses include King's Handbook of Hydraulics, nomographs from the Bureau of Public Roads, the City of San Diego and other commonly accepted sources.

Summary

The following table summarizes the results of this analysis.

Before and After Flows

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Conclusions

This project would have a minor or negligible impact the drainage flowing off the property. The reason for this is that most of the flows affected by the project originates on-site and stays on-site until empting onto Lakeshore Drive at the southeast corner of the property. After the project the flow will continue to discharge at the southeast corner of the property. Also during construction the drainage flow path on-site will be maintained. The result is that the project has no impact to adjacent properties.

The following describes the location of the concentration point that is used for this study.

Concentration point 1 is at the southeasterly property corner at the point where the flow from the project property enters Lakeshore Drive. Because the topography in the area the flow crosses the project property in a sheet flow mode that will be maintained. This will have the advantage of providing a location for bio-remediation while minimizing the chance of erosion.

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PRELIMINARY HYDROLOGY REPORT

OWNER: Shellstrom D/C 2000 Trust

Declaration of Responsible Charge

I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the Business and Professions Code, and the design is consistent with current standards.

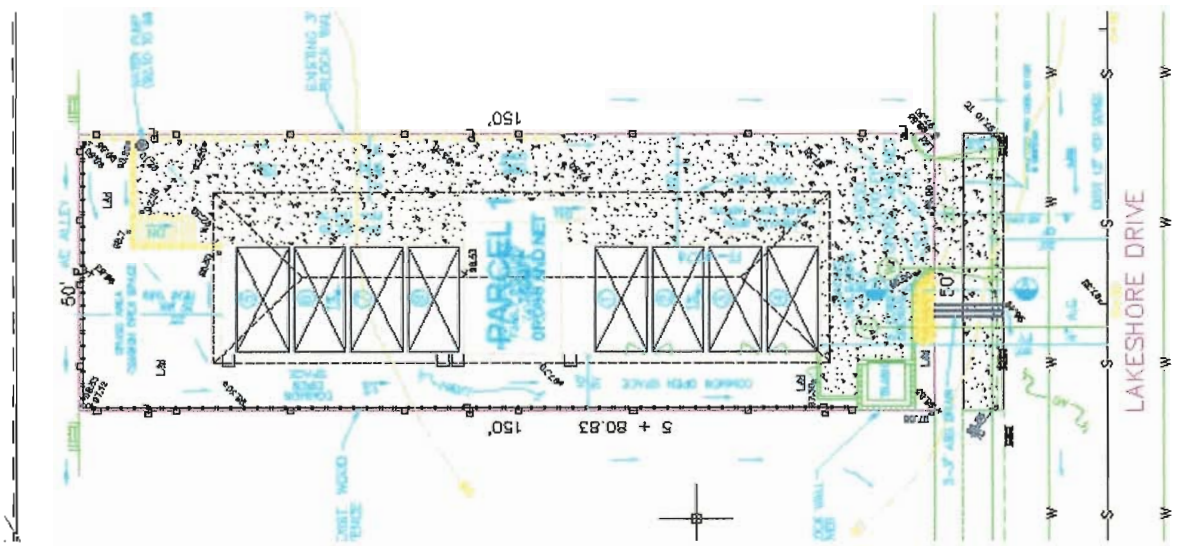
I understand the check of the project drawings and specifications by the County of San Diego is confined to review and does not relieve me of responsibilities for project design.

May Engineering & Surveying
9880 North Magnolia Ave. #205
Santee, CA 92071

Elliott M. May R.C.E. 18592 — 7-15-08 Date
My registration expires 6-30-2009

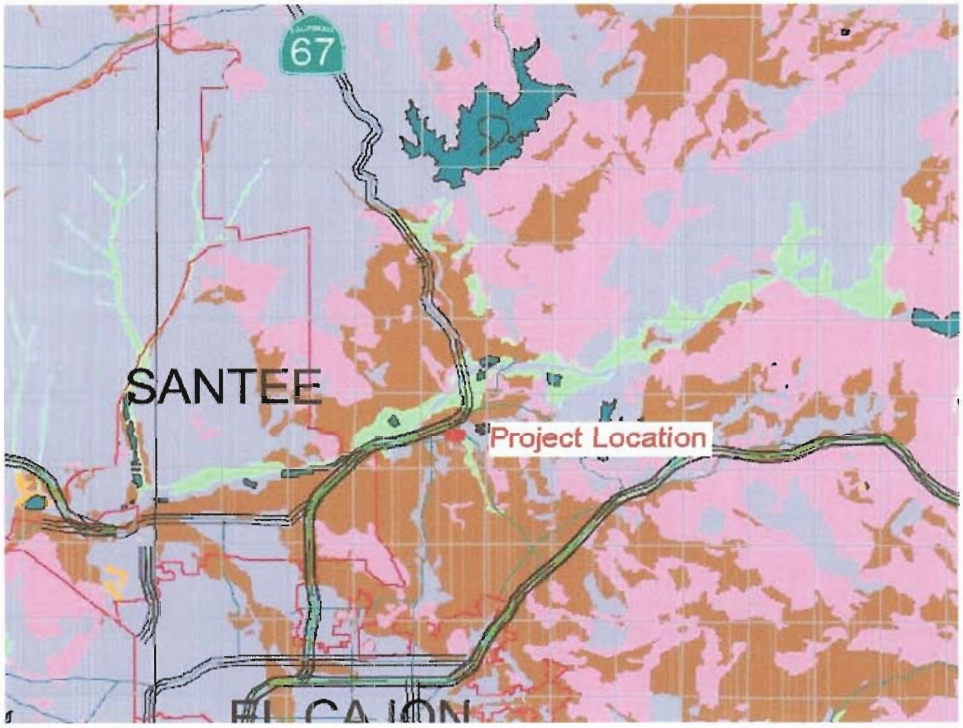
Watershed Boundary/Topographic Map

There is no 200 scale topographic map showing the watershed boundaries and the concentration points used in this analysis. This is because the drainage basin is so small it would not be decernable at 200 scale. Additionally, the drainage basin is confined to the project site so the grading plan adequately displays the entire drainage basin. This property like most properties within the area was designed to be self-contained little drainage basins emptying into the adjacent street (Lakeshore Drive in this case). The grading plan itself is effectively a map of the watershed.

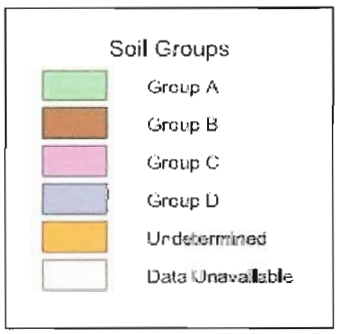


Soil Hydrologic Groups

The following map of Soil Groups is from the San Diego County Hydrology Manual. As can be seen, the soil group for the drainage basins within this project is Soil Group "B". This type of soil results in the moderate runoff during storms because of its ability to absorb the rainwater. This fact is reflected in the analysis of the basin as shown later in this report.



Legend



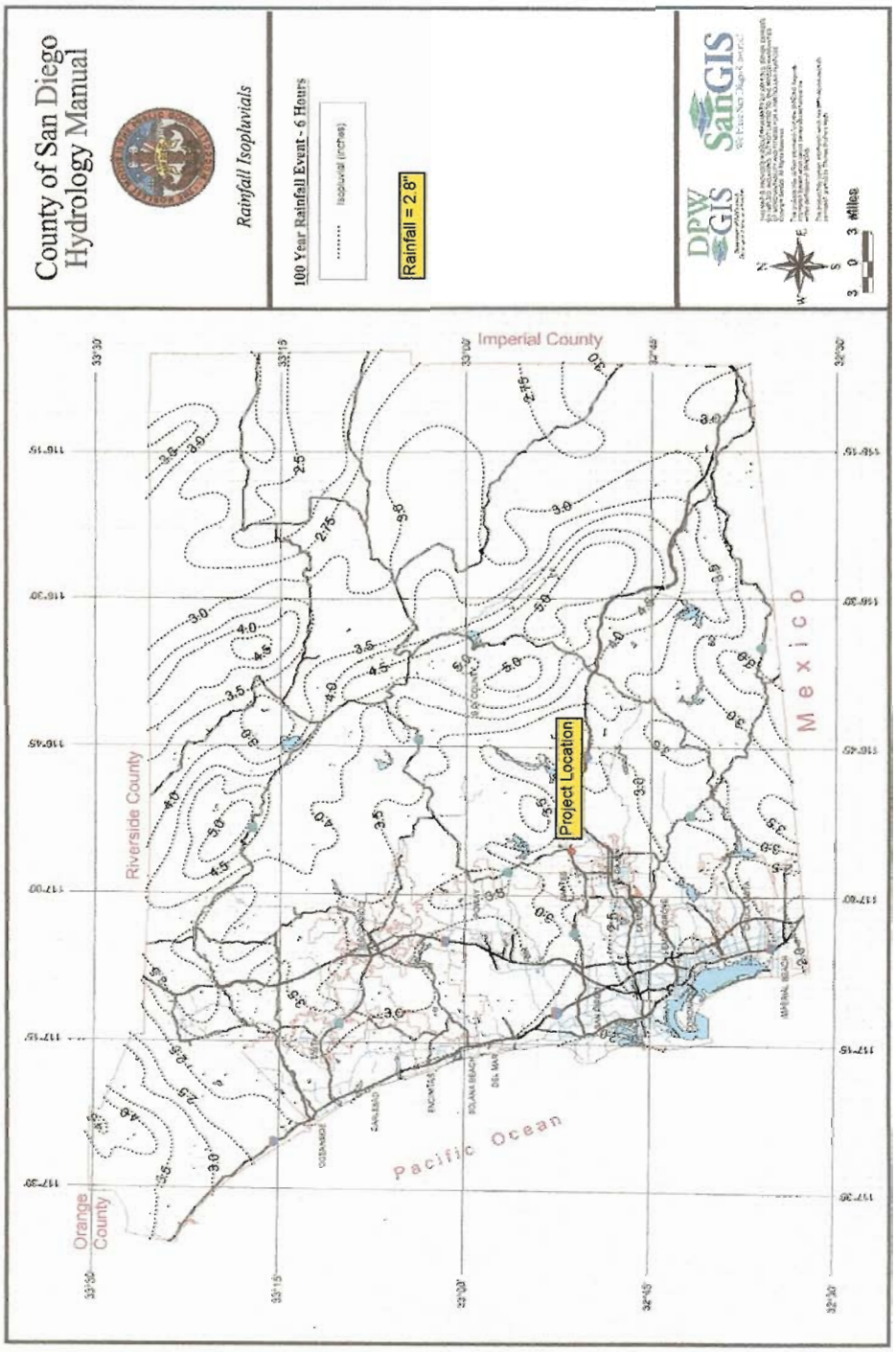
Runoff Coefficients for Urban Areas

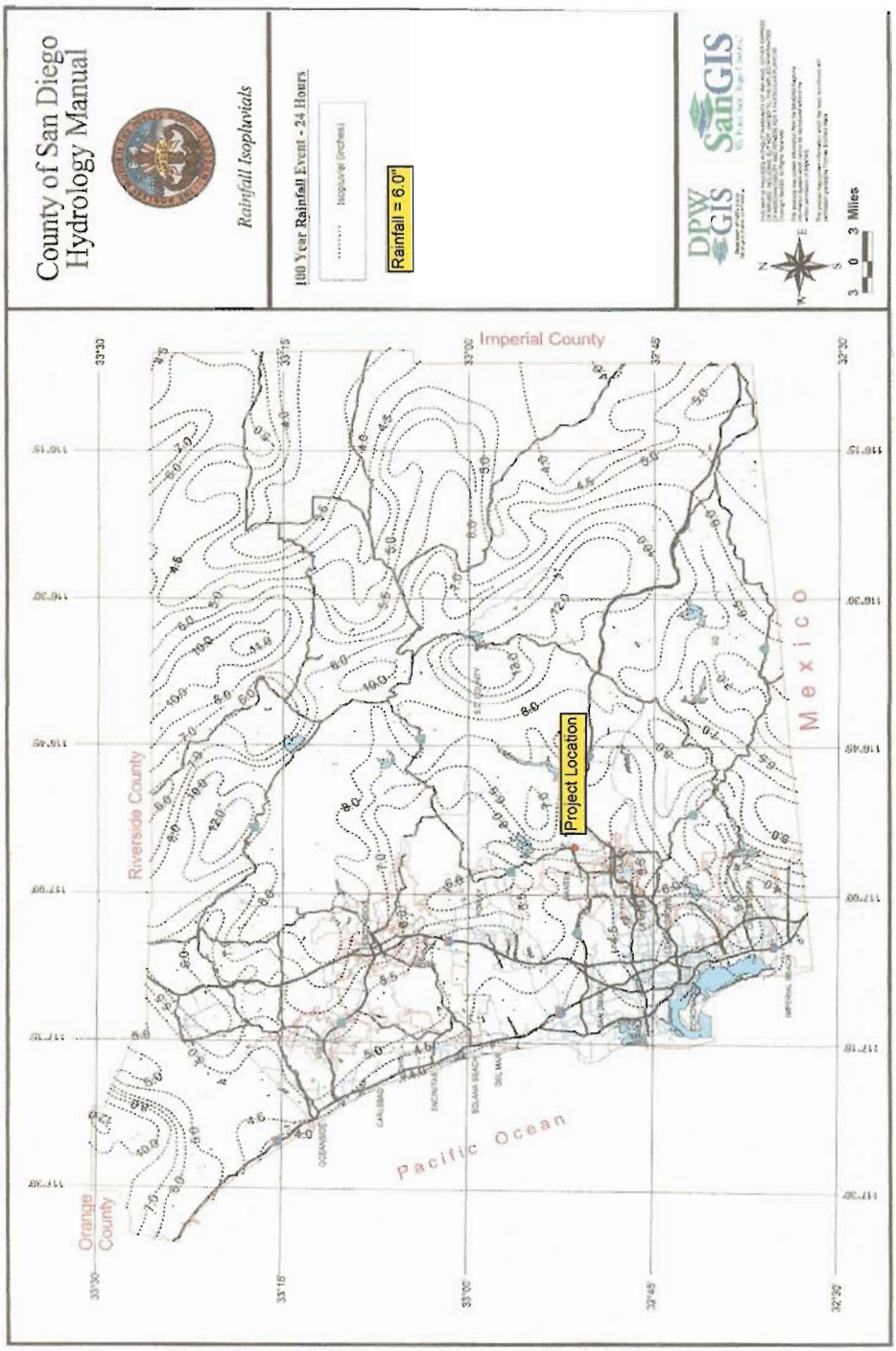
The following table was used for the runoff calculations in this analysis. It is from the San Diego County Hydrology Manual Table 3-1.

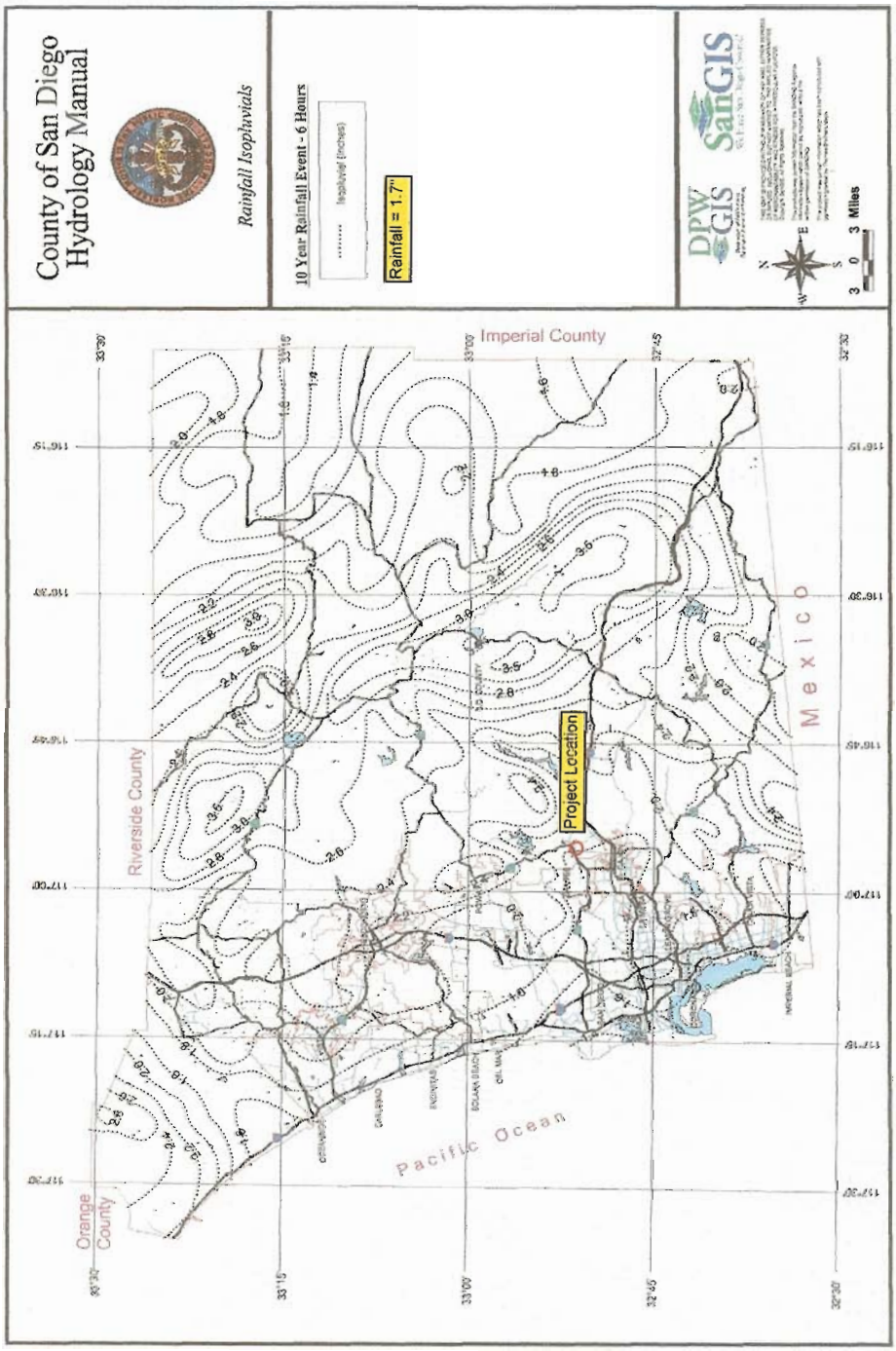
Index	Table 3-1 Land Use	% Imper	Soil Type A	B	C	D
1	Natural	0	0.20	0.25	0.30	0.35
2	LDR 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
3	LDR 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
4	LDR 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
5	MDR 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
6	MDR 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
7	MDR 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
8	MDR 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
9	HDR 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
10	HDR 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
11	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
12	General Commercial	85	0.80	0.80	0.81	0.82
13	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
14	Commercial/Industrial Limited	90	0.83	0.84	0.84	0.85
15	Commercial/Industrial General	95	0.87	0.87	0.87	0.87

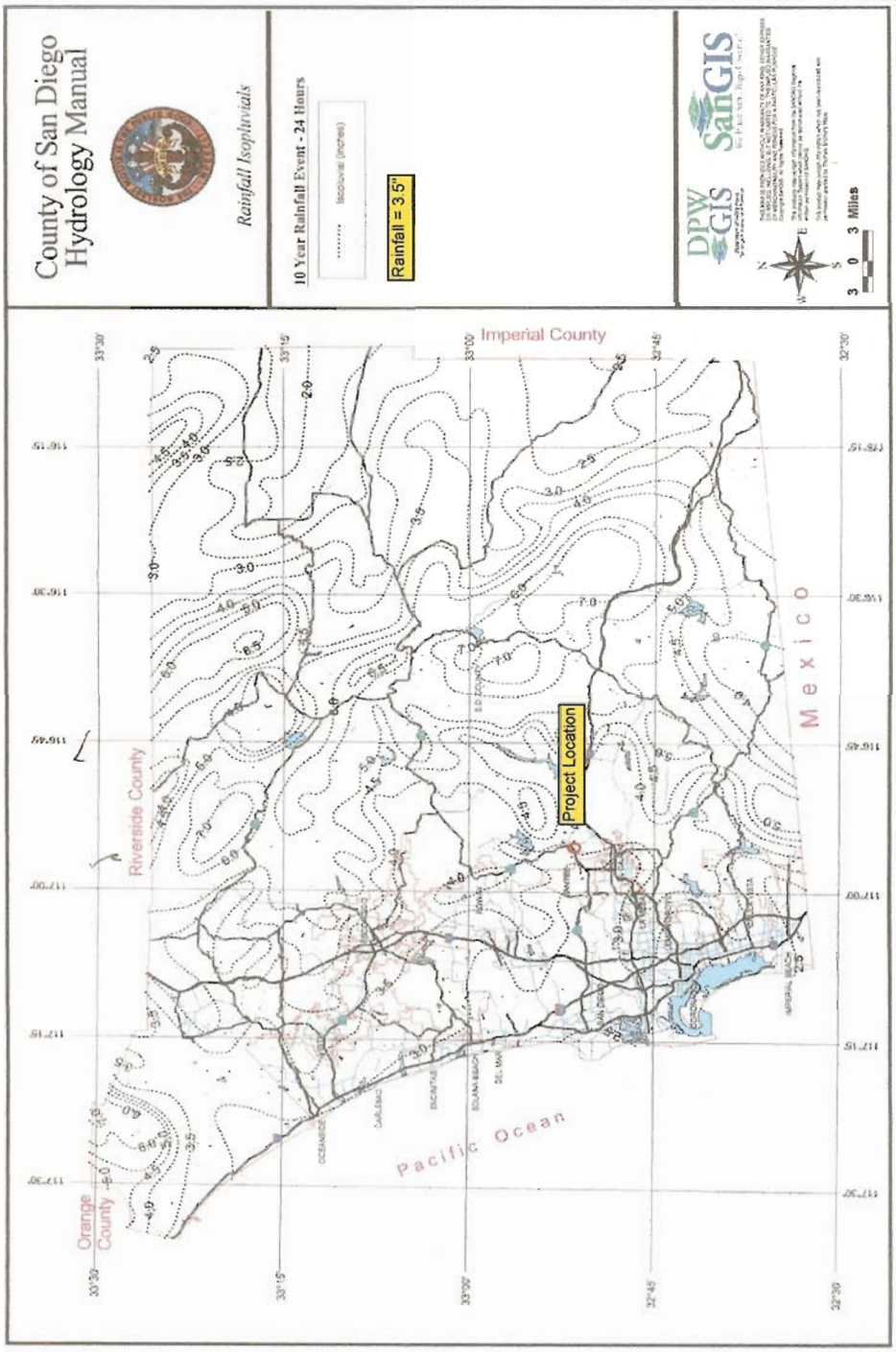
Rainfall Isopluvials

The following rainfall isopluvial maps are from the San Diego County Hydrology Manual. The design rainfall amounts are 2.7" for the 100-year 6-hr event and 6.0" for the 100-year 24-hour event. Since this analysis evaluates small basins and uses the Rational Method the 100-year 6-hour event is the controlling event and is used throughout this analysis. The 6-hour event is between 0.45 and 0.65 of the 24-hour event and therefore does not need to be adjusted as described in the Hydrology Manual.


County of San Diego
Hydrology Manual
Rainfall Isopluvials
100 Year Rainfall Event - 6 Hours
Rainfall = 2.8"
DPW GIS
SanGIS
Imperial County
Riverside County
Orange County
Mexico
Pacific Ocean
Project Location


County of San Diego
Hydrology Manual
Rainfall Isopluvials
100 Year Rainfall Event - 24 Hours
Isopluvial (inches)
Rainfall = 6.0"
DPW GIS
SanGIS
3 0 3 Miles
Imperial County
Riverside County
Orange County
Mexico
Pacific Ocean
Project Location


County of San Diego
Hydrology Manual
Rainfall Isopluvials
10 Year Rainfall Event - 6 Hours
Rainfall = 1.7"
DPW GIS
SanGIS
3 0 3 Miles
Imperial County
Riverside County
Orange County
Project Location
Mexico
Pacific Ocean


County of San Diego
Hydrology Manual
Rainfall Isopluvials
10 Year Rainfall Event - 24 Hours
Isopluvial (inches)
Rainfall = 3.5"
DPW GIS
SanGIS
3 0 3 Miles
Imperial County
Riverside County
Orange County
Pacific Ocean
Mexico
Project Location

Area Calculations

The following table summarizes the area and other relevant features of this drainage basin. The basin was measured from the Grading Plan. This property like most properties created in this area was designed as a self-contained drainage basin discharging onto the adjacent street.

Basin Properties

Point #	Basin #	Area (acres)	Hi pt	Low pt	100' elev	Elev change	Basin Length
1	A	0.17	97	96	96	1	150
1 after project	A	0.17	98	97	97	1	150

Storm Properties

Selected Frequency =	100	year	10	year	2	year
6 hr precipitation =	2.8	inch	1.7	inch	1.2	inch
24 hr precipitation =	6.0	inch	3.5	inch	1.6	inch

Hydrology Analysis Before & After Conditions

Hydrology Calculations

Hydrology Analysis area(s) =	**A**		Conc Pt =	1	
Development Conditions =	Before Project				
Land Use Designation =	Natural		Index=	1	
Calculate C*A	Area	C value	C * A	(C values from Table 3-1)	
Total Area (acres)	100%	0.17			
Area A soil	0%	0.00	0.20	0.00	
Area B soil	100%	0.17	0.25	0.04	
Area C soil	0%	0.00	0.30	0.00	
Area D soil	0%	0.00	0.35	0.00	
Sum C*A			0.25	0.04	
High Point		97			
Low Point		96			
100' elevation		96			
Slope after 100'		0.60%			

Calculate Tc

Approximate slope for the first 100' of the basin=			1	%
D = distance over which Ti develops =			100	feet (Table 3-2)
Ti = 1.8(1.1-C)(d^0.5)/s^0.33		From Figure 3-3)		
Ti =	17.2	min.		

Tt = Travel time in natural channel

Assume a 0.5' wide bottom with 3:1 side slopes as average shape of the natural channel.

Assume an average flow rate of 1/2 expected flow for travel time calculation.

Q=	0.1	c.f.s.	a=	0.18 sq.ft
BW =	0.5	feet	p=	6.50 ft.
Z =	3.0	:1	r=	0.03 ft.
s =	1%		Q=	0.07
n =	0.030		diff	0.00
Depth =	0.05	feet		
Velocity =	0.4	f.p.s.		
Basin Length =	150	feet		
less Ti distance =	100	feet		
Tt distance =	50	feet		
Tt distance/Velocity =	141	seconds		
=	2.3	minutes		
Tc = Ti + Tt =	19.6	minutes		
Selected Frequency =	100	year		
6 hr precipitation =	2.8	inch		
24 hr precipitation =	6.0	inch		
6 hr/24 hr precip =	0.47	(0.45 - .65) OK		
Adjusted 6 hr =	2.8	inch		
I = (7.44*P6)*(D^-0.645) =	3.06	inch/hr		
Q=Sum(C*A) * I	**0.13**	**c.f.s.**		

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Hydrology Calculations

Hydrology Analysis area(s) =		**A**		Conc Pt =	1
Development Conditions =		After Project			
Land Use Designation =		HDR 24.0 DU/A or less		Index=	9
Calculate C*A		Area	C value	C * A	(C values from Table 3-1)
Total Area (acres)	100%	0.2			
Area A soil	0%	0.0	0.66	0.00	
Area B soil	100%	0.2	0.67	0.11	
Area C soil	0%	0.0	0.69	0.00	
Area D soil	0%	0.0	0.71	0.00	
Sum C*A			0.67	0.11	
High Point		98			
Low Point		97			
100' elevation		97			
Slope after 100'		0.35%			

Calculate Tc

Approximate slope for the first 100' of the basin=	1	%	
D = distance over which Ti develops =	100	feet	(Table 3-2)
Ti = 1.8(1.1-C)(d^0.5)/s^0.33	From Figure 3-3)		
Ti =	8.7	min.	

Tt = Travel time in natural channel

Assume a 0.5' wide bottom with 3:1 side slopes as average shape of the natural channel.

Assume an average flow rate of 1/2 expected flow for travel time calculation.

Q=	0.3	c.f.s.	a=	0.64 sq.ft
BW =	0.5	feet	p=	6.51 ft.
Z =	3.0	:1	r=	0.10 ft.
s =	0%		Q=	0.30
n =	0.040		diff	0.00
Depth =	0.18	feet		
Velocity =	0.5	f.p.s.		
Basin Length =	186	feet		
less Ti distance =	100	feet		
Tt distance =	86	feet		
Tt distance/Velocity =	184	seconds		
=	3.1	minutes		
Tc = Ti + Tt =	11.8	minutes		
Selected Frequency =	100	year		
6 hr precipitation =	2.8	inch		
24 hr precipitation =	6.0	inch		
6 hr/24 hr precip =	0.47	(0.45 - .65) OK		
Adjusted 6 hr =	2.8	inch		
I = (7.44*P6)*(D^-0.645) =	4.25	inch/hr		
Q=Sum(C*A) * I	**0.48**	**c.f.s.**		

Channel Inlet Culvert Analyses

There are no detailed channel or culvert analyses for this project since there are no culverts or channels in the project

Detention Basins

Because there would be only minor increase between the runoff leaving the site before the project compared with the runoff after the project (0.3 c.f.s. difference) no detention basins will be constructed.

Misc. Details

There are no miscellaneous details for this project.